

WHAT IS CLAIMED IS:

1. A chimeric polypeptide comprising:
 - a) at least one transmembrane segment;
 - b) a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide; and
 - c) an intracellular reporting segment.
2. The chimeric polypeptide of claim 1, wherein said chimeric polypeptide comprises at least two transmembrane segments, and wherein said extracellular domain is an extracellular loop.
3. The chimeric polypeptide of claim 1 wherein said sorting segment is selected from the group consisting of c-myc, FLAG, 6xHIS, and Hemagglutinin.
4. The chimeric polypeptide of claim 1 wherein said sorting segment is selected from the group consisting of avidin and streptavidin.
5. The chimeric polypeptide of claim 1 wherein said reporting segment is bioluminescent.
6. The chimeric polypeptide of claim 5 wherein said reporting segment fluoresces upon exposure to ultraviolet or visible light having a wavelength between 300 nm and 600 nm.
7. The chimeric polypeptide of claim 6 wherein said reporting segment is selected from the group consisting of amFP486, asFP600, cFP484, dgFP512, dmFP592, drFP583, drFP583/dmFP592, dsFP483, zFP506, zFP538, GFP, GFPuv, GFPmut1, EGFP, ECFP, EYFP, EBFP, BFP2, d4EGFP, d2EGFP, d1EGFP, d4EGFP, DsRed, and DsRed1.

8. The chimeric polypeptide of claim 1 wherein said reporting segment is capable of enzymatic catalysis.

9. The chimeric polypeptide of claim 1 wherein said reporting segment is positioned at the carboxy terminus of said chimeric polypeptide.

10. The chimeric polypeptide of claim 1 wherein said reporting segment is positioned at the amino terminus of said chimeric polypeptide.

11. A cell containing a chimeric polypeptide, said chimeric polypeptide comprising:

- a) at least one transmembrane segment;
- b) a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide; and
- c) an intracellular reporting segment.

12. A nucleic acid encoding a chimeric polypeptide, said chimeric polypeptide comprising:

- a) at least one transmembrane segment;
- b) a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide; and
- c) an intracellular reporting segment.

13. A cell containing the nucleic acid of claim 12.

14. A nucleic acid construct comprising a coding sequence operably linked to a promoter, wherein said coding sequence encodes a chimeric polypeptide comprising:

- a) at least one transmembrane segment;

- b) a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide; and
- c) an intracellular reporting segment.

15. A cell containing the nucleic acid construct of claim 14.

16. A method of isolating specific cells, comprising:

- a) detecting said specific cells in a transgenic organism expressing a chimeric polypeptide, said chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment, wherein said specific cells are detected by the presence of said reporting segment in said specific cells; and
- b) isolating said specific cells by using said sorting segment.

17. A method of isolating specific cells, comprising:

- a) detecting said specific cells in a mixture of cells, wherein said specific cells express a chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment, wherein said specific cells are detected by the presence of said reporting segment in said specific cells; and
- b) isolating said specific cells using said sorting segment.

18. A method of isolating specific cells that express a chimeric polypeptide, comprising:

- a) providing a population of transgenic organisms, a plurality of transgenic organisms in said population containing a nucleic acid construct, said nucleic acid construct comprising a coding sequence operably linked to a promoter, wherein said coding sequence encodes said chimeric polypeptide comprising at least one

transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment;

- b) identifying said specific cells within at least one transgenic organism in said plurality by detecting the presence of said reporting segment in said specific cells; and
- c) isolating said specific cells by using said sorting segment.

19. A method of isolating a specific cell, said method comprising:

- a) providing a population of cells, a plurality of cells in said population expressing a chimeric polypeptide, said chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment;
- b) identifying said specific cell in said plurality by detecting the presence of said reporting segment in said specific cell; and
- c) isolating said specific cell by using said sorting segment.

20. The method of claim 19, wherein said specific cell comprises at least one nucleic acid construct, said nucleic acid construct comprising a coding sequence operably linked to a promoter, wherein said coding sequence encodes said chimeric polypeptide.

21. The method of claim 19 wherein said population of cells comprises two or more different specific cells.

22. The method of claim 21 wherein said population of cells is an organ, organ sample, tissue, or tissue sample.

23. A method of isolating specific cells, said method comprising:

- a) detecting said specific cells in a transgenic organism, wherein said transgenic organism contains:

- i) a first nucleic acid construct comprising a first promoter, at least one transcription activator binding sequence operably linked to said first promoter, and a first coding sequence operably linked to said first promoter and to said transcription activator binding sequence, wherein said first coding sequence encodes a chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment; and
- ii) a second nucleic acid construct comprising a second promoter, and a second coding sequence operably linked to said second promoter, wherein said second coding sequence encodes a transcriptional activator polypeptide, said transcriptional activator polypeptide comprising a DNA binding domain and a transcription activation domain, and wherein said chimeric polypeptide is expressed in said specific cells, and wherein said specific cells are detected by the presence of said reporting segment in said specific cells; and
- b) isolating said specific cells using said sorting segment.

24. A method of isolating specific cells, said method comprising:

- a) detecting said specific cells in a mixture of cells, wherein said specific cells contain:
 - i) a first nucleic acid construct comprising a first promoter, at least one transcription activator binding sequence operably linked to said first promoter, and a first coding sequence operably linked to said first promoter and to said transcription activator binding sequence, wherein said first coding sequence encodes a chimeric polypeptide, said chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment; and
 - ii) a second nucleic acid construct comprising a second promoter, and a second coding sequence operably linked to said second promoter, wherein said second coding sequence encodes a transcriptional activator polypeptide

comprising a DNA binding domain, and a transcription activation domain, wherein said specific cells are detected by the presence of said reporting segment in said specific cells; and

b) using said sorting segment to isolate said specific cells, wherein said chimeric polypeptide is expressed in said specific cells.

25. The method of claim 24 wherein said first promoter is a minimal promoter.

26. A method for isolating specific cells that express a chimeric polypeptide, said method comprising:

a) providing a population of transgenic organisms, a plurality of transgenic organisms in said population containing:

i) a first nucleic acid construct comprising a first promoter, at least one transcription activator binding sequence operably linked to said first promoter, and a first coding sequence operably linked to said first promoter and to said transcription activator binding sequence, wherein said first coding sequence encodes a chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment; and

ii) a second nucleic acid construct comprising a second promoter, and a second coding sequence operably linked to said second promoter, wherein said second coding sequence encodes a transcriptional activator polypeptide, said transcriptional activator polypeptide comprising a DNA binding domain and a transcription activation domain;

b) identifying said specific cells within at least one transgenic organism in said plurality by detecting the presence of said reporting segment in said specific cells; and

c) isolating said specific cells by using said sorting segment.

27. A method for isolating a specific cell, said method comprising:

a) providing a population of cells, a plurality of cells in said population containing:

- i) a first nucleic acid construct comprising a first promoter, at least one transcription activator binding sequence operably linked to said first promoter, and a first coding sequence operably linked to said first promoter and to said transcription activator binding sequence, wherein said first coding sequence encodes a chimeric polypeptide, said chimeric polypeptide comprising at least one transmembrane segment, a sorting segment within an extracellular domain of said chimeric polypeptide, said sorting segment positioned at other than the amino terminus of said chimeric polypeptide, and an intracellular reporting segment; and
- ii) a second nucleic acid construct comprising a second promoter, and a second coding sequence operably linked to said second promoter, wherein said second coding sequence encodes a transcriptional activator polypeptide comprising a DNA binding domain, and a transcription activation domain, wherein said cells are detected by the presence of said reporting segment in said cells;

b) identifying said specific cell by detecting the presence of said reporting segment in at least one cell of said plurality; and

c) isolating said specific cell by using said sorting segment.

28. The method of claim 27 wherein said population of cells comprises two or more different specific cells.

29. The method of claim 27 wherein said population of cells is an organ, organ sample, tissue, or tissue sample.